April 10, 1856.

Colonel SABINE, R.A., V.P. and Treasurer, in the Chair.

The following communications were read:—

I. "Account of Experiments on the Vagus and Spinal Accessory Nerves." By AUGUSTUS WALLER, M.D., F.R.S. Received March 31, 1856.

(Abstract.)

The important functions of the organs more or less completely dependent for their innervation on the vagus nerve, have afforded the reason of so many attempts by previous physiologists to determine the exact influence exerted by the fibres arising from different sources which are intimately blended together in the trunk of the mixed vagus. Since Sir Charles Bell's discovery of the different functions of the anterior and posterior roots of the spinal pairs, it has become still more important to determine how far the same law holds good with regard to the vagus nerve, and whether at its origin, it is a purely sensory nerve, receiving its motor fibres from the internal branch of the spinal accessory and perhaps from other sources. According to Bischoff and Longet, the vagus at its origin and as far as the upper ganglion, is purely sensory, and becomes possessed of motor power from its junction with the internal branch of the accessory, and from other branches derived from motor nerves (Longet). The observations of Bernard have led him on the contrary to adopt the opinion, that the vagus at its origin is a mixed nerve; because after destroying the spinal accessory, no effect on the functions of the heart, stomach, or lungs was observed, and the only organs visibly dependent on the spinal accessory were the larynx and pharynx. After bearing testimony to the correctness of the observations made by Bernard with regard to the effects immediately following destruction of the spinal accessory, the author considered it desirable to apply to the determina-

tion of this question his new means of investigation, in addition to those previously employed. His first observations on the vagus, published in the 'Comptes Rendus' of the Académie des Sciences, 1852, had already led him to entertain the idea, that the vagus proper was a purely sensory nerve. They first consisted in cutting this nerve between its upper and lower ganglia, the section comprising the internal branch of the spinal accessory. After the animal had been kept alive for a sufficient period to cause disorganization of the nerve fibres, the central and distal portions were examined microscopically. In the central portion, the fibres of the internal branch of the spinal accessory included in the section were all in a sound state; some of the fascicles of origin of the vagus were also sound; the remaining fascicles of origin of the vagus consisted of disorganized fibres. The analogy existing between the results as to the last-mentioned fibres, and those which follow section of the sensory roots of the spinal nerves, led the author to the conclusion, that the disorganized fibres of the fascicles of the vagus were likewise sensory, and had their trophic centre in its lower ganglion, while the sound fibres probably had their trophic centre in the upper ganglion. On these grounds, and some others affording concurrent testimony, he concluded that the vagus in itself was probably a purely sensory nerve. In the distal end, the part below the second ganglion consisted likewise of a mixture of sound and altered fibres. When tested by galvanism on the living animal, it was found that the nerve had lost all power of exciting movement in the various organs which it supplies, and that such branches of known motor power as the recurrent and the crico-thyroid were disorganized in their structure. It was evident therefore that the lower ganglion did not arrest the disorganization of the motor fibres contained in the vagus, because, as has been proved by the author in other cases, when the disorganization of the motor fibres of nerves distributed to muscles is arrested,—as by the superior cervical ganglion of the sympathetic nerve, or by the effect of hybernation in the frog,—the motor power of these nerves is retained.

In the present observations, the accessory nerve was divided at its origin by Bernard's process of evulsion of its roots, and after the lapse of about a fortnight the vagus was tested by galvanism, and examined by the microscope, in order to ascertain the functions

which it had lost, and the fibres which were disorganized, the sound vagus on the opposite side being taken as a standard of comparison. On the sound side, galvanism of the vagus caused each time strong dilatation of the glottis by the retraction of the corresponding arytenoid cartilage. On the operated side, galvanism produced a slight movement of the glottis on the same side by drawing inwards of the arytenoid.

On the heart, the action of galvanism of the sound vagus was manifest by the stoppage of the pulsation of the carotid arteries and the diminution of their calibre. On the operated side, no influence on the pulsation of the vessels was observed by galvanizing the vagus. When the heart was exposed by removing a portion of the thorax, and keeping up artificial respiration, galvanism on the sound vagus produced complete stoppage of the heart's action, while on the opposite side, irritation of the vagus exerted no influence on the heart.

The stomach being exposed was found distended with food. Galvanism of the sound vagus caused evident contractions of this organ, which were strongest at the neck or constriction which it usually presents (in the rabbit),—from whence they radiated in both directions, becoming more and more faint. On stimulating the other vagus, from which the accessory had been virtually eliminated, no perceptible influence was observed.

Microscopic examination showed that the cervical part of the vagus of the side operated on contained numerous disorganized fibres, almost all collected together in a single fasciculus, which included only a few normal fibres. In the recurrent branch were disorganized fibres, corresponding very closely to those found in the vagus above it. Below the recurrent, the vagus and its cardiac, pulmonary and gastric branches consisted almost entirely of normal fibres, most of which, as is well known, are nucleated fibres.

From the foregoing observations, the author draws the conclusion, that from the spinal accessory are derived the greater part of the motor fibres contained in the vagus, which govern the movement of the larynx, the heart, and the stomach. He likewise infers from the microscopic examination of the vagus below the recurrent, that the motor fibres distributed to the heart and stomach belong almost exclusively to the nucleated or 'Remak' fibres.

The author purposes communicating in a future paper his researches on the other organs supplied by the vagus.

The above experiments were principally carried out in the laboratory of M. Flourens at the Jardin des Plants, who facilitated in every way the researches, and where the author had the able assistance of Drs. Philipeaux and Vulpian.

II. "Extract of a Letter to GEORGE RENNIE, Esq., F.R.S., from P. A. SECCHI, Director of the Astronomical Observatory of the Collegio Romano, containing explanatory remarks on a drawing of the Lunar Spot 'Copernicus,' presented by him to the Royal Society. Dated Rome, March 13, 1856." Communicated by GEORGE RENNIE, Esq., F.R.S.

"As to the drawing of the spot of the moon, it is a first attempt to obtain an accurate representation of the interesting spot 'Copernicus.' In such large dimensions, photography directly taken with the telescope has been impossible; I therefore made first an accurate triangulation of the spot with the micrometer, and the principal points were thus laid down on the chart, after which operation the rest was filled in by the eye alone. The power used has been always either 1000 or 760. As it was impossible to carry through such a work in a single night, on the first night of good opportunity a general outline was taken, and on the other evenings particular drawings were made, and all these parts, taken in different grades of light and shadow, were afterwards harmonized together and compared with the moon when the point of light was seen to be the same as on the first night. So this work occupied more than six months, that is, all the favourable positions (two at each lunation) which could be obtained. I do not pretend it to be yet accurate enough to be transferred from photography* to any kind of engraving, but I am watching every good occasion to make it complete. But before bestowing more time and labour, I should be glad to know the impression such a work may make among the scientific men of England. I must observe that the most distant outliers of the crater have not been included," &c.

* The figure presented to the Society is a photographic copy of the original drawing.—(ED.)